IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.	:	**10/506619**
Applicant	:	Torri et al.
Filing date	:	September 14, 2004
Title	:	Free-Radical Functionalized Polysaccharides
TC/A.U.	:	1623
Examiner	:	**Lau**
Docket No.	:	**5497**
Customer No.	:	26936

Commissioner for Patents
P.O. Box 1450
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AMENDMENT

Sir:

Please amend this application as follows:

Amendments to the Claims:

1. (currently amended) Method for functionalizing polysaccharides using a physical or chemical source of free radicals, which forms stable radicals on a polysaccharide structure wherein at least one of the formed radicals reacts with a functionalized olefin, comprising:

a first step, wherein a free radical on a polysaccharide chain is formed, and

a second step, wherein said radical reacts with an olefin in the absence of a radical source; ~~and~~ wherein

the polysaccharide is in the form of a fiber ~~and wherein~~ ;

the amount of functional groups introduced in the polysaccharide is between 10^{-3} and 2 mol olefin/eq anhydrous glucose; and

the physical source is electron beam radiation, and the chemical source is Fenton's reagent.

2 - 3. (canceled)

4. (previously presented) Method according to claim 1, wherein the polysaccharide is selected from the group consisting of flax fibers, cellulose, viscose and cotton fibers.

5. (previously presented) Method according to claim 4, wherein the polysaccharide is used together with one or more natural or synthetic fibers.

6. (previously presented) Method according to claim 5, wherein the natural or synthetic fibers are selected from silk, polyamide, polyester, polyacrylate and polyolefin.

7. (previously presented) Method according to claim 1, wherein, in the first step, the free radical is generated by electron beam having a radiation dose between 10 and 400 kGy.

8. (previously presented) Method according to claim 7, wherein the radiation dose is between 20 and 200 kGy.

9. (canceled)

10. (previously presented) Method according to claim 1, wherein the stable radicals have a half-life of about 1 day.

11. (previously presented) Polysaccharides obtainable by the method of claim 1.

12. (previously presented) Polysaccharides according to claim 11, wherein the ratio mol olefin/eq anhydrous glucose is between 10^{-2} and 1.

13. (previously presented) Process for the preparation of functionalized polysaccharides or polymer fibers comprising:

a) forming stable radicals on a polysaccharide from a physical or chemical free radical source wherein the physical source is electron beam radiation, and the chemical source is Fenton's reagent; and

b) reacting, in the absence of the free radical source, an olefin containing a functional group with the stable radicals on the polysaccharide.

14. (canceled)

15. (new) Method according to claim 1, wherein the amount of functional groups introduced in the polysaccharide is between 10^{-2} and 1 mol olefin/eq anhydrous glucose.

Remarks/Arguments:

This is a reply to the office action of June 15.

Claims 1 - 6, 10 - 13 and 15 stand rejected as anticipated by Kataoka et al.
Claims 1 - 5 and 11 - 13 stand rejected as anticipated by Zara et al.
Claims 1 - 3 and 7 - 8 stand rejected as obvious over Kataoka et al. in view of Weil.

In this paper, we have amended Claims 1 and 13 adding to them the limitations of claims 2 and 3, now canceled.

Claim rejection - 35 USC § 102

Limitation to these two free radical sources overcomes the anticipation rejection over Kataoka et al.

Concerning Zara, we respectfully disagree with the Examiner. In fact, during decomposition of Fenton's reagent, the concentration of reagents decreases asymptotically. Thus the concentration of reagents never becomes zero, although at some moment it may become undetectable.

Consequently, the statement of the Examiner that at least the last polymerization reaction will take place in the absence of radical source is incorrect, since even after 50 minutes of reaction there will be a very low concentration of Fenton's reagent.

The statement present in Zara simply means that the amount of Fenton's reagent after 50 minutes is irrelevant or non-detectable, not that it is zero.

Thus, Zara does not anticipate claim 1.

Claim rejection - 35 USC § 103

Claim 1 differs from Kataoka et al. not only by the use of a different radiation source.

First of all, pending claim 1 relates to a "method for functionalizing polysaccharides" in the form of a fiber, while Kataoka et al. teaches a method for functionalizing a textile fabric and a non-woven fabric.

Furthermore, Kataoka et al. discloses the use of hydrophobic and hydrophilic textiles, however the preferred textiles are the hydrophobic ones: all examples are performed with polyester textiles. When discussing the amount of monomer (col 7, lines 18-26), the patent states: "The amount of monomer can be selected, as required, depending on the reaction conditions and the like, and it is not particularly limited if it is an amount by which a hydrophilic nature corresponding to the use can be imparted to another surface of the textile fabric or the nonwoven fabric. For example, it is between 0.3% by weight and 2% by weight..."

It is evident that the range of monomer is referring to the case of hydrophobic textiles, since it specifies that it has to be an amount capable of rendering the surface hydrophilic. Consequently, it is our opinion that Kataoka et al. does not disclose any amount of functional groups introduced in *a hydrophilic material such as a polysaccharide.*

Weil et al. contains a very generic teaching that electron beam can be used to generate free radicals on a textile. It generates free radical on the surface of a textile and the free radical immediately reacts with the phosphonate compound.

Hence, it is not evident why the skilled person would be motivated to combine two documents which are so different. Even if it were the case, which we do not admit, the skilled person starting from Kataoka and willing to use an electron beam instead of

plasma, would start from one of the examples of Kataoka and modify it according to the teaching of Weil. Consequently, the skilled person would apply electron beam radiation only to *a hydrophobic textile such as polyester.*

Thus, the subject matter of claims 1 and 13 involves an inventive step over Kataoka in view of Weil.

We believe the claims now presented are patentable over the prior art of record, and that this application is now in condition for allowance.

Respectfully submitted,

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